Atypical visual-auditory predictive coding in Autism Spectrum Disorder

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Atypical Visual-Auditory Predictive Coding in Autism Spectrum Disorder

Electrophysiological Evidence from Stimulus Omissions

PRESENTER

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SUMMARY

Autism Spectrum Disorder (ASD) is a pervasive neurodevelopmental disorder that has been linked to a range of perceptual processing alterations, including hypo- and hyperresponsiveness to sensory stimulation.

Recent evidence suggests that these symptoms might be related to a decreased ability to anticipate upcoming sensory stimulation.[1] The results of this study showed that individuals with ASD may be unable to fully anticipate the sensory consequences of their own motor actions.

This raised the question if the ability to predict the actions of other individuals is altered as well in ASD.

Here, we used a stimulus omission paradigm to examine the electrophysiological markers of prediction error[2] in auditory prediction by vision in individuals with ASD to assess their ability to anticipate the sensory consequences of others' actions.

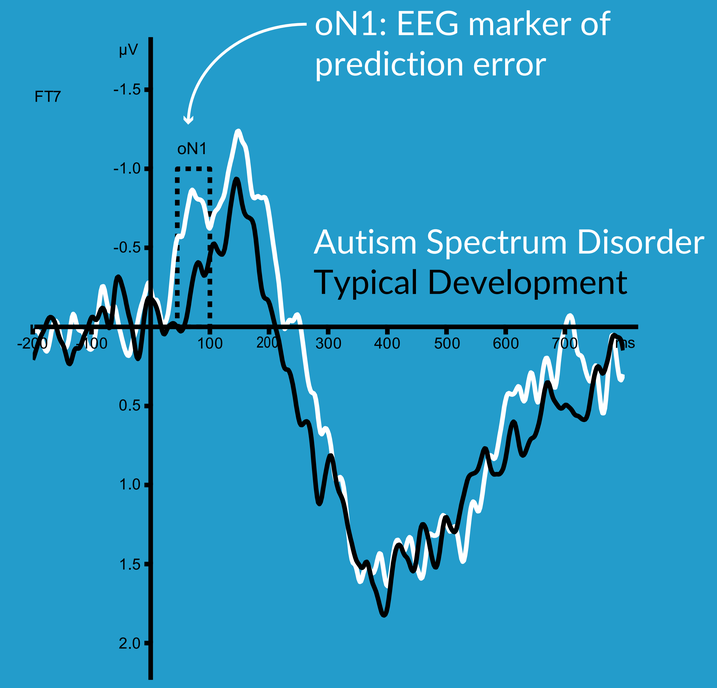
Unexpected auditory omissions in a sequence of audiovisual recordings in which the visual motion reliably predicted the timing and content of the sound elicited **larger prediction errors** in our sample of individuals with ASD.

The current data suggest that individuals with ASD may have impairments in the ability to anticipate the sensory consequences of others' actions and support the notion that sensory prediction might be overly precise and inflexible in ASD.[3]

1. van Laarhoven, T., Stekelenburg, J. J., Eussen, M. L. J. M. J. M., & Vroomen, J. (2019). Electrophysiological alterations in motor-auditory predictive coding in autism spectrum disorder. *Autism Research*, *12*(4), 589–599. https://doi.org/10.1002/aur.2087
2. Friston, K. (2005). A theory of cortical responses. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *360*(1456), 815–836. https://doi.org/10.1098/rstb.2005.1622
3. van de Cruys, S., Evers, K., van der Hallen, R., van Eylen, L., Boets, B., de-Wit, L., & Wagemans, J. (2014). Precise minds in uncertain worlds: Predictive coding in autism. *Psychological Review*, 121(4), 649–675. https://doi.org/10.1037/a0037665

Violations of visual-to-auditory **predictions** induce **larger prediction errors** in **Autism Spectrum Disorder**

Sound Omission ERPs
(measured in silence)

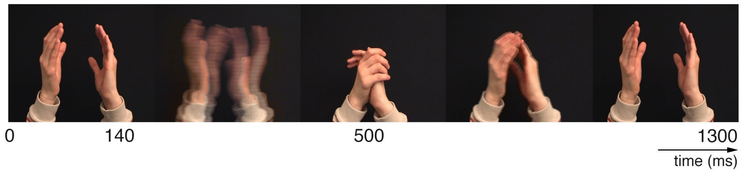


Take a picture to **download** the **abstract**
(manuscript currently under review)

PARTICIPANTS

Group	Sample size	No. females	Mean age	Mean IQ
ASD	29	8	18.64	103.03
Typical Development	29	6	18.93	112.07

EXPERIMENTAL CONDITIONS



Visual-auditory (VA)
- video + sound
- **1232 trials (88%)**

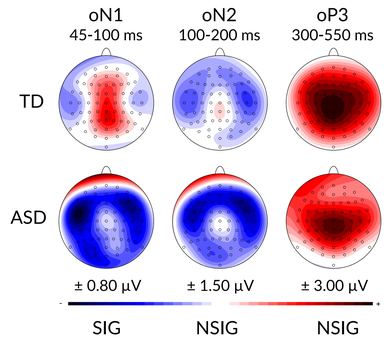
VA trials were interspersed with **168 unpredictable sound omission trials** (**12%** of all 1400 trials)

Visual (V)
- video only
- **200 trials**

V trials were included to correct for visual activity in the sound omission trials of the VA condition (VA-V)

RESULTS

Scalp Potential Maps of Sound Omission Trials



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